

The use of radial artery interpositional graft between recipient splenic artery and graft artery in living donor liver transplantation

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Living donor liver transplantation (LDLT) has become an established treatment for adult patients with end-stage liver disease, including those with hepatocellular carcinoma (HCC). Many of these patients with HCC have undergone various therapies prior to liver transplantation, including transcatheter arterial embolization (TAE) [1].

Repeated TAE can injure the hepatic artery intima, resulting in difficulties with conventional arterial reconstruction. While sufficient hepatic arterial flow is essential for successful liver transplantation, the graft artery usually is short without a cuff, and arteries available for anastomosis are very limited in LDLT. We report LDLT by using the radial artery interpositional graft between recipient splenic artery and graft artery for an HCC patient with pre-operative hepatic arterial occlusion resulting from frequent TAE.

A 56-year-old man with hepatitis B-related cirrhosis and multiple HCC was referred for LDLT. The tumors had been treated five times with TAE, as well as percutaneous microwave coagulation therapy, following the subsegmentectomy. The patient was categorized as Child–Pugh A (score 6); model for end-stage liver disease score 18; and tumor-nodes-metastasis-based stage III. Computed tomography of the abdomen demonstrated multiple HCC, with the largest having a diameter of 34 mm. Abdominal angiography disclosed complete obstruction of the proper hepatic artery and severe narrowing of the common hepatic artery, although the celiac axis and splenic artery remained intact. Allen's test ensured that both the radial and ulnar arteries fully supplied blood to both hands.

A right lobe graft with the middle hepatic vein was transplanted from the patient's wife. The hepatic artery was unsuitable for arterial reconstruction because of severe intimal dissection and poor blood flow. The recipient's right gastroepiploic artery was dissected to evaluate the suitability for reconstruction, but was extremely thin and showed very poor blood flow. We attempted to dissect the splenic artery for direct anastomosis to the graft, but venous collaterals around the artery interfered with continuing dissection to the distal end of the artery to allow the direct anastomosis. Finally, we decided to use

the left radial artery as an interpositional vascular graft between the splenic artery and the hepatic artery of the graft. The recipient splenic artery was divided and anastomosed to the radial artery in end-to-end fashion. The radial artery was then anastomosed end-to-end to the right hepatic artery of the graft. Both anastomoses were carried out under an operating microscope. Patency of the arterial reconstruction was very good, and the patient had an uneventful postoperative course. The patient is well without HCC recurrence and patency of hepatic artery is also well after 12 months follow-up.

Although reports of patients with pre-operative hepatic arterial occlusion undergoing LDLT are few [2], some reports requiring the unconventional arterial reconstruction because of hepatic arterial complication in liver transplantation have described. When the original hepatic artery of the recipient could not be used, an alternative artery such as the splenic [3–5], gastroepiploic [6–8], or left gastric artery [9] was anastomosed directly with a good result. Direct anastomosis without a vascular graft has the advantage of requiring only a single anastomosis. However, the alternative artery for direct anastomosis needs to be straighter and longer than in deceased-donor liver transplantation, as in LDLT the graft artery usually is short while excessive stretching at the site of anastomosis leads to arterial complications.

Other studies have reported successful anastomosis by using the saphenous vein [10], inferior epigastric artery [11], sigmoid artery [12], or radial artery [2,8,13], or the inferior mesenteric artery [14] as an interpositional graft. Although an interposed vascular graft requires a double anastomosis, it can prevent arterial stretching and resolve host versus graft artery size-mismatch problems when optimally selected.

We consider the radial artery to be an optimal interpositional graft in this situation because it offers more adequate length and diameter for hepatic arterial reconstruction [2] than other vascular grafts reported in previous studies. The radial artery now is used often in a coronary artery bypass grafting where it has shown excellent long-term patency compared with saphenous vein

[15]. Further, complications related to its procuring are few and minor, as its removal does not adversely affect the subsequent forearm function or blood flow to a clinically important degree in patients with a negative Allen's test [15]. This is the first report of hepatic arterial reconstruction in LDLT with interposition of a radial artery graft between the graft artery and the recipient splenic artery. The splenic artery must be dissected more length to obtain the adequate length to reach the graft directly in LDLT, if it is used for direct anastomosis, compared with in deceased-donor liver transplantation, but accompanying vessels around it can pose significant difficulties in dissecting the distal end. Even when possible, dissection of the splenic artery up to the distal end may cause pancreatitis, pancreatic necrosis, and chylous ascites [4,10]. The advantage of our strategy is that isolation of the splenic artery involves relatively little difficulty and no aortic cross-clamping, unlike anastomosis with the infrarenal portion of the aorta. As an interposition graft, the radial artery tapers from the proximal to the distal end, reducing size discrepancy at the proximal anastomosis with the splenic artery and the distal anastomosis with the graft artery.

Interposition of the radial artery between splenic artery and graft artery is simple, and appears appropriate as one strategy for arterial reconstruction in LDLT requiring unconventional arterial reconstruction.

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